

Design and Development of Electromechanical Juicer-Mixer-Grinder

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Abstract: Different types of Juicer/Mixer/Grinders are available in the market. Authors developed an innovative Prototype Model of Electro- Mechanical Juicer-Mixer Grinder, which comprises an integrated electrically driven power transmission system as well as manual power transmission system. This innovative Juicer-Mixer-Grinder is more useful for rural areas and it is also useful for urban areas. It can work even at the time of power cut or power failure. A lot of electrical energy can be saved by using this Juicer-Mixer-Grinder in manual mode.

Keywords: Fruit and vegetable Juicer, Juice extractor Multi food Processor, Juicer-Mixer-Grinder.

I. INTRODUCTION

Juicer-Mixer-Grinders are being used to fulfill human needs. There are different applications of Juicer-Mixer-Grinders. There are also a number of available devices for processing food and producing juice. At the present time there are a number of commercially available juicer mixer grinders. [1] US Patent No. 2, 297, 880, Oct. 6, 1942 discloses a fruit and vegetable juicer and having its primary object to provide a juicing machine of a form particularly convenient to use. [2] US Patent No. 2, 311, 379, Feb. 16, 1943 disclose a juicer particularly adopted for juicing fruit, vegetable and the like by cutting or grinding them between opposite cutter plates and then separating the juice from the pulp by centrifugal force. [3] US Patent No. 4, 345, 517, 1982 discloses a juice extractor, with improvement in fruit and vegetable juice extractors of the type wherein the fruit and vegetables or the like are grated or ground and centrifuged for separation of the juice from the pulp or solid part. [4] US Patent No. 4, 506, 601, 1985 discloses a juice extractor having a device for controlling the flow of pulp which automatically adjusts itself to retard, discharge of the pulp from the juice extractor and thereby result in high yield of the juice from a given product input quantity. [5] US Patent No. 5, 421, 248, 1985 discloses a Multi-Food Processor and Juice Extractor, which is used for the processing a food and in particular to a device for the processing of food into juice and smaller particulate food pieces. Most of these devices are powered electrically and in some cases are operated manually. In developing countries like India, the power demand is more than the power generation, so per capita power consumption is very low. [6] Authors have developed an innovative prototype model of Electro-Mechanical Juicer-Mixer-Grinder and a patent application has been filed in Patent Office, New Delhi.

[7] M/S Kawachi Group Mumbai is manufacturing non electrical hand fruit juicer. [8] M/S Jagjeet Engg. Works Delhi is manufacturing hand operated juicer. There are many manufacturers which are manufacturing different types of juicer mixer grinders, but these are not similar to the juicer mixer grinder developed by the authors. The objective of this invention is to provide a juicer mixer grinder, which is operated manually as well as power driven. This innovative juicer mixer grinder is a integrated unit having manual operation system as well as power driven system. This juicer mixer grinder can be changed from manual mode to power driven mode or vice versa by just pushing or pulling a lever. The juicer mixer grinder is equally useful for rural as well as urban areas. Electrical energy can be saved by using this juicer mixer grinder in manual mode.

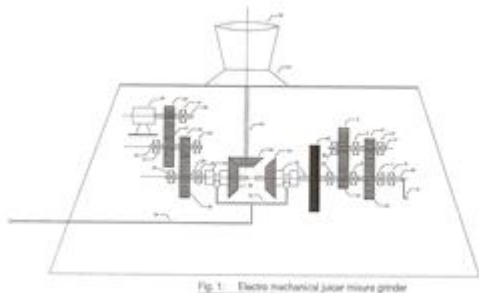
II. OBJECTIVE OF PRESENT INVENTION

- To provide a Juicer-Mixer-Grinder to save electrical energy if it is used in manual mode.
- To provide a Juicer-Mixer-Grinder, this is very useful for rural areas.
- To provide a Juicer-Mixer-Grinder, which can be operated in manual mode as well as power driven mode.
- To provide a Juicer-Mixer-Grinder, which can be operated manually at the time of power failure or power cut.
- To provide a Juicer-Mixer-Grinder which is simple in design and easy in operation.
- To provide a Juicer-Mixer-Grinder which can be used in remote areas.

III. WORKING PRINCIPLE

As shown in Fig. 1, Electro-Mechanical Juicer-Mixer-Grinder is in electrically powered mode. As shown in Fig. 1, Spur gears 3, 24, 5 and 30 are mounted on shafts 1, 26 and 11 which are supported on bearings 2, 4, 33, 6, 7, 9 and 27. A handle 8 is attached with shaft 26 to rotate the shaft 26, which rotates gear 24. This gear 24 is meshed with gear 3, which is mounted on shaft 1. Another gear 5 is also mounted on the same shaft 1. The gear 5 is meshed with gear 30, which is mounted on shaft 11. Thus gears 24, 3, 5 and 30 comprise a compound gear train. If the shaft 26 is rotated, motion and power is transferred from this shaft to the shaft 11 through the above said compound gear train. A fly wheel 10, sleeve 12

and bevel gear 13 are mounted on the shaft 11. The sleeve 12 is fixed with bevel gear 13. The shaft 11 is made splined at one end so that bevel gear 13 and sleeve 12 can be rotated with their axial movements in either direction.



As shown in "Fig. 1", power driven system comprises an electric motor 36, motor shaft 35, spur gears 23, 37, 22, 38 and bevel gear 39, bearings 34, 31, 21, 25 and 20, shafts 32 and 28 and a sleeve 19. Spur gear 23 is mounted on motor shaft 35, which is supported by bearing 34 at one end. The spur gear 23 is meshed with spur gear 37. Spur gear 37 and 22 are mounted on shaft 32 which is supported by bearing 31 and 21. The spur gear 22 is meshed with spur gear 38, which is mounted on shaft 28. This shaft 28 is supported by bearing 25 and 20. The sleeve 19 is fixed with bevel gear 39. The sleeves 19 and 12 are connected through a fork 16. A lever 29 is fixed with fork 16. The sleeves 12 and 19 are permanently fixed with the level gears 13 and 39. The bevel gear 14 is mounted at one end of the spindle 15 and on the other end of this spindle mixer 18 is attached with the help of base 17. The mixer 18 can be replaced by juicer or grinder as in case of electrically operated juicer mixer grinder.

As the motor starts, power and motion from motor is transmitted to juicer, mixer, grinder through a compound gear train (comprising gears, 23, 37, 22, 38) and bevel gears 39, 24 and spindle 15.

When some one wants to run the Juicer-Mixer-Grinder in manual mode, bevel gear 13 is meshed with bevel gear 14 and bevel gear 39 is disengaged from the bevel gear 14 with the help of sleeves 12, 19, fork 16 and lever 29. As the lever 29 is pulled in left side bevel gear 13 is meshed with bevel gear 14 and simultaneously bevel gear 39 is disengaged from the bevel gear 14. When juicer mixer grinder is run in power driven mode, lever 29 is pushed in right side which disengages the bevel gear 13 from the bevel gear 14 and bevel gear 39 is engaged with bevel gear 14. Thus Juicer-Mixer-Grinder remains at its position at the time of shifting the power transmission system from manual mode to power driven mode or vice versa. The ratio of motor rpm to rpm of shaft 28 is 4:1 and ratio of rpm of shaft 26 to rpm of spindle 15 is 1:64.

IV. DISCUSSION

The fruit and vegetable juicer developed by US Patent No. 2, 297, 880, Oct. 6, 1942 discloses a fruit and vegetable juicer and having its primary object to provide a juicing machine of a form particularly convenient to use. US Patent Nos. 2, 311, 379, Feb. 176, 1943, 4, 345, 517, 1982, 4, 506, 601, 1985, discloses fruit / vegetable juice extractors. US Patent No. 5, 421, 248, 1995 discloses a Multi-Food Processor and

Juice Extractor, which is used for processing a food and in particular to a device for the processing of food into juice and smaller particulate food pieces. Most of these devices are electrically powered, and in some cases are operated manually, but the innovative Juicer-Mixer-Grinder developed by the authors is manual as well as electrically driven.

In developing countries like India, the power demand is more than the power generation, so per capita power consumption is very low. This innovative Juicer-Mixer-Grinder can be changed from power driven mode to manual mode for vice-versa by shifting a lever without any other change, so work can be carried out at the time of power failure or power cut. Manual power transmission system and electrically driven power transmission systems are integrated in a single unit, so it is compact in design. This Juicer-Mixer-Grinder is simple in operation and maintenance. It is also easy to manufacture.

V. CONCLUSION

- This Juicer-Mixer-Grinder can be operated manually if electricity is not available.
- This Juicer-Mixer-Grinder is simple in design.
- This Juicer-Mixer-Grinder is easy in maintenance resulting low maintenance cost.
- This Juicer-Mixer-Grinder is easy to manufacture resulting low product cost.
- This Juicer-Mixer-Grinder can be operated in manual or power mode according to the requirement.
- Electrical energy can be saved by using this Juicer-Mixer-Grinder in manual mode.
- Green house gases can be reduced by using this Juicer-Mixer-Grinder in manual mode as the electrical energy can be saved in manual mode.
- This Juicer-Mixer-Grinder is more useful for remote areas and undeveloped countries where electrical energy is not available in remote areas.
- This Juicer-Mixer-Grinder is compact in design as manual and power driven systems are integrated.
- This Juicer-Mixer-Grinder can be shifted from manual mode to power driven mode or vice-versa by shifting a lever without any other change.

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